CLAIMS

What is claimed is:

1. An microfluidic mixer apparatus comprising:

a substrate having an aperture formed therein; and

at least two channels also formed within the substrate such as to terminate at the aperture, where the at least two channels which terminate at the aperture terminate obliquely with respect to the aperture such as to effect a swirling mixing of at least two reagents introduced into the aperture through the at least two channels.

2. The microfluidic mixer apparatus of claim 1 further comprising:

a cover plate covering the substrate and the aperture; and

an outlet port assembled to the cover plate and centered over the aperture.

3. The microfluidic mixer apparatus of claim 1 wherein the substrate is formed from a material selected from the group consisting of conductor materials, semiconductor materials and dielectric materials.

4. The microfluidic mixer apparatus of claim 1 wherein the aperture is formed in a geometric shape selected from the group consisting of circular geometric shapes, elliptical geometric shapes, irregular continuous sided geometric shapes and polygonal geometric shapes.

5. A method for operating a microfluidic mixer apparatus comprising:

providing a microfluidic mixer apparatus comprising

a substrate having an aperture formed therein; and

at least two channels also formed within the substrate such as to terminate at the aperture, where the at least two channels which terminate at the aperture terminate obliquely with respect to the aperture such as to effect a swirling mixing of at least two reagents introduced into the aperture through the at least two channels; and

introducing into the aperture the at least two reagents through the at least two channels.

6. The method of claim 5 further comprising:

a cover plate covering the substrate and the aperture; and

an outlet port assembled to the cover plate and centered over the aperture.

7. The method of claim 5 wherein the substrate is formed from a materials selected from the group consisting of conductor materials, semiconductor materials and dielectric materials.

8. The method of claim 5 wherein the aperture is formed in a geometric shape selected from the group consisting of circular geometric shapes, elliptical geometric shapes, irregular continuous sided geometric shapes and polygonal geometric shapes.

9. A microfluidic reactor apparatus comprising:

a substrate having an aperture formed therein, the aperture having a first end portion contiguous with a middle portion in turn contiguous with a second end portion, wherein the middle portion of the aperture, but not the first end portion of the aperture or the second end portion of the aperture, has at least one baffle which intrudes into the aperture.

10. The microfluidic reactor apparatus of claim 9 further comprising:

a cover plate covering the substrate including the aperture; and

a pair of inlet/outlet ports assembled to the cover plate to access the first end portion of the aperture and the second end

portion of the aperture.

11. The microfluidic reactor apparatus of claim 9 further comprising a sorbant material immobilized within the aperture including the at least one baffle.

12. The microfluidic reactor apparatus of claim 9 wherein the substrate is formed from a material selected from the group consisting of conductor materials, semiconductor materials and dielectric materials.

13. A method for operating microfluidic reactor apparatus comprising:

providing a microfluidic reactor apparatus comprising:

a substrate having an aperture formed therein, the aperture having a first end portion contiguous with a middle portion in turn contiguous with a second end portion, wherein the middle portion of the aperture, but not the first end portion of the aperture or the second end portion of the aperture, has at least one baffle which intrudes into the aperture; and

introducing a liquid sample into the aperture.

14. The method of claim 13 further comprising:

a cover plate covering the substrate including the aperture; and

a pair of inlet/outlet ports assembled to the cover plate to access the first end portion of the aperture and the second end portion of the aperture.

15. The method of claim 13 further comprising a sorbant material immobilized within the aperture including the at least one baffle.

16. The method of claim 13 wherein the substrate is formed from a material selected from the group consisting of conductor materials, semiconductor materials and dielectric materials.

17. A nucleic acids extraction apparatus comprising:

a substrate having at least one channel formed therein for effecting an extraction of said nucleic acids, said substrate being formed of a material selected from the group consisting of beads and micro-carriers for extracting and immobilizing nucleic acids on surfaces of said at least one channel.

18. A method for extracting nucleic acids comprising the steps of:

providing a nucleic acids extraction apparatus comprising:

a substrate having at least one channel formed therein for effecting an extraction of said nucleic acids, said substrate being formed of a material selected from the group consisting of beads and micro-carriers for extracting and immobilizing nucleic acids on surfaces of said at least one channel; and

flowing a nucleic acid solution into said at least one channel and driving said nucleic acid solution back and forth in said channel.